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Songs of the shamans? Acoustical studies in European prehistory

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Sound is one of the lost dimensions of the prehistoric and early historic past. In recent years, multisensory approaches have sought new ways of addressing this deficiency, moving beyond those developed by music archaeologists to consider not the sound producers (instruments) but the spaces in which sound and “music” may have played a particular important role. This has included analyses of Palaeolithic painted caves and Neolithic chambered tombs and stone circles. The otherworldly significance of special sounds is well attested by ethnographic studies. The transfer of such a general perspective onto mute prehistoric structures is however methodologically challenging. This chapter briefly reviews recent work in this field and argues that close attention to the archaeological evidence may sometimes be effective in constraining the range of possible scenarios. Whether music was used to induce altered states of consciousness or heighten awareness among participants within these ceremonial structures, however, remains open to question.

Ancient structures sometimes produce curious acoustic effects. Among the most famous is the sound associated with the Colossi of Memnon, the pair of gigantic seated statues set-up at Thebes in Egypt by pharaoh Amenhotep III in the 14th century BCE. The Greek writer Strabo, towards the end of the 1st century BCE, provided the earliest account, describing how on certain days soon after dawn one of the statues emitted a noise likened by a later writer to the breaking of a lyre string. Strabo suspected that the sound was a trick produced by someone standing close to the base of the statue (Strabo *Geography* 17: 46). On the other hand, Philostratus (*Life of Apollonius of Tyana* 6: 4) was convinced that the statue spoke. This curious phenomenon drew important visitors: inscriptions carved on the base of the statue record that they included the Roman emperor Hadrian in November AD130, and his successor Septimius Severus in AD199, but by the end of the following century repairs had rendered the statue silent (Bowersock 1984). The ‘voice’ was in fact an accidental phenomenon, resulting from the partial collapse of the monolithic statue shortly

before Strabo's visit, and something that no ancient Egyptian or Roman engineer or architect had designed or intended.

The 'singing' Colossus of Memnon serves to introduce some of the difficulties in interpreting the acoustical properties of ancient structures and spaces. There can be little doubt as to the reality of the effect. What is in question is whether human agency may be held responsible for that effect.

This is the dilemma that confronts archaeologists seeking to interpret the acoustics of enclosed spaces. Those spaces include not only what we may loosely call 'buildings' but also natural places such as caves and rock shelters. Barry Blesser and Linda-Ruth Salter have speculated on the meaning and impact of sound for our distant ancestors. Imagine passing by a cave mouth. "Sound entering a cavern is changed sufficiently that, when it radiates back through the opening, it seems as though it is coming from within. The cavern would not be quiet: as you passed by its opening, you would have heard the cavern speak to you. The voice of a resonant cave is more than a literary metaphor. You would have felt the cave was alive when it acknowledged your presence by responding to your footsteps with a voice of its own. From an experiential perspective, a cave is something that has a voice and sounds alive. Only from a modern, scientific perspective is it simply a natural hollow with sonic reflections and resonances" (Blesser & Salter 2007, 71).

These 'aural architectures', each with its own acoustic, are capable of influencing our moods and associations. An open space can produce feelings of freedom or insecurity, while the aural architecture of a chapel can enhance the privacy of quiet contemplation (Blesser & Salter 2007, 2). Furthermore, Blesser & Salter note the "native ability of human

beings to sense space by listening” illustrated, for example, by the way most people when blindfolded can detect the proximity of a wall through changes in the background noise as they approach it. Striking examples of this ability are provided by visually-impaired people who are capable of cycling in unfamiliar places by the simple use of echo-location (Blessner & Salter 2007, 38).

Yet while the biology of hearing is invariant across peoples and cultures, the way we listen is not. Understanding aural architecture requires an acceptance of the cultural variability of human sensory experiences. Since Aristotle, Western societies have generally considered sight to be the primary sense, followed by hearing, smell, taste, and then touch, in that order. Aristotle occasionally declared hearing to be more conducive to knowledge than sight, and Aquinas regarded hearing as the most important, since it was the sense through which the word of God is perceived (Classen 1993, 3). Nevertheless it is visualism that has been dominant in Western culture. That dominance became increasingly pronounced with the spread of literacy, and has been held to be the primary basis of science and the Enlightenment.

Other societies do things differently. The Suyá of the Brazilian Mato Grosso consider hearing to be the mark of the fully-socialized individual, and sight to be an anti-social sense, cultivated only by witches and demons. The Tzotzil of Mexico order their world by temperature, the Onge of the Andaman Islands by smell and the Desana of Colombia by synaesthetic colours (Classen 1993, 9-10). As Classen remarks, “[t]hese sensory cosmologies make us aware of the many different ways in which cultures shape perception, and the inability of standard Western models to comprehend such sensory and symbolic diversity” (Classen 1993, 137). Much is attributed to the environments in which different

societies live. Thus the Kaluli of highland Papua New Guinea dwell in dense tropical rainforest where distant views are rare. “Adaptation to life in a forest environment develops acute spatial skills for audition, and Kaluli use these to advantage over vision” (Feld 1982, 62). Birdsong is especially important within this visually limited environment, and forest birds play a key role in Kaluli myth and symbolism. Sounds structure time and the seasons. For the Kaluli, indeed, “the environment is like a tuning fork, providing well-known signals that mark and coordinate daily life” (Feld 1984, 394).

This approach to the anthropology of the senses has not been without its critics. Ingold, for example, challenges the contrast that has so frequently been drawn between the dominance of the visual in Western society and the primary place occupied by other senses in other non-Western societies. He accepts that some societies may use metaphors referring mainly to vision, while for others metaphors of hearing are more common. Ingold suggests, however, that the metaphors arise not from social conditioning but through shared bodily experience, by “people’s efforts to make themselves understood . . . by drawing comparisons between their own sensory practices and experiences and those attributable to their fellows” (Ingold 2000, 285). He argues that the emphasis should be on the lived experience of individuals rather than on the collective consciousness of societies. Hence individuals even within a single society may have different perceptions of the world. Nonetheless, insofar as members of different societies share common experiences of specific environments and practical engagements, their understanding of the senses may still be very unlike that familiar to modern Western observers.

All this argues caution in interpreting the nature of aural experiences in the past. Twenty-first century technology provides us with an impressive array of equipment through which

to examine surviving ancient structures. Modern audio engineers can synthesise the acoustics of those structures, backed up in some cases by the survival of musical instruments and written records describing performance. We cannot, however, re-create the aural experience of the original communities and individuals who used or lived in the structures. However hard we try, we will still hear acoustic environments from our own perspective as modern listeners (Blessner & Salter 2007, 68). This extends to ‘naturally’ produced sounds, such as the howls of the wolves reintroduced to Yellowstone National Park in 1995. Their reintroduction may be thought to have restored an element of the ‘original’ environmental soundscape, but as Coates remarks, even if the sound itself is “materially identical to the howl of a wolf there when the first Euro-American explorer showed up or when the first human of any kind was around to hear it”, the way we perceive it today is different to how Native Americans or others would have perceived it in the past (Coates 2005, 657-8).

It is evident, nonetheless, that the natural world creates special or striking sounds that enhance the sensory qualities of particular settings or spaces. These often add to a sense of mystery, with wind and water featuring frequently as the primary agents. The noise of the rushing water over the Nämforsen rapids in northern Sweden conferred on them a special power and may explain the concentration of rock art found on the rock faces and outcrops (Goldhahn 2002). A similar suggestion has been made for the rock art of the Tagus valley (Garcês & Nash 2017). In the Upper Palaeolithic decorated cave of La Garma in northern Spain, a group of five hand stencils marks the only place within the cave where the sound of a river at a lower level of the karst can be heard (Arias 2009, 268). The sounds of ground movement, water, wind and wildlife in caves, waterholes and limestone sinkholes may have been one of the factors that encouraged Mesoamericans to regard them as sacred

(Bruchez 2007). Nor are these associations exclusive to pre-modern or non-western societies. Seventeenth-century Englanders considered thunder “a speech act on the part of God or perhaps demons. . . . [N]atural sounds – which emanated from the speech acts of the invisible world – could break buildings, judge, and kill” (Rath 2003, 13-14).

Thus acoustic effects are part of the natural world animate and inanimate, and have evoked powerful human responses. They have been incorporated into mythologies and cosmologies, and into frameworks of symbolism and morality. They may also have formed part of prehistoric practices and beliefs sometimes labelled as ‘shamanistic’. A shamanistic significance has been proposed for example for decorated Neolithic drums from TRB sites in northern Europe (Wyatt 2009, 2010). Whether ‘shamanism’ is an appropriate term in this context is open to question, but music or sound is a key feature of most social ceremonies and is likely to have been so in prehistory.

‘Art’ and acoustics

Caves and rock shelters illustrate the ability not just of humanly built structures but also of natural places to produce acoustic effects that can be culturally interpreted. The issue is to determine whether they were so interpreted – whether particular echoes or sounds were held significant – by the early societies who experienced them. This is especially challenging in prehistoric contexts that by definition do not offer the supporting evidence of written testimony. The problem is that every such space will have its own acoustic, and enclosed spaces have acoustics that set them apart from the world of outdoor experience. Identifying which of those spaces, and which of these acoustic effects, were culturally

significant to prehistoric societies must therefore be argued either from broad ethnographic analogy or from direct archaeological evidence.

The deep caves of southwest France contain some of the earliest symbolic and figurative motifs in western Europe. Some 20 years ago, in a pioneering study, Dauvois and Reznikoff analysed the acoustic properties of two painted caves, Le Portel and Oxocelhaya, paying particular attention to the property of resonance, where the air within the cave amplifies sound owing to the morphology of the enclosing rock walls (Reznikoff & Dauvois 1988; Scarre 1989). In both caves a close locational match was found between simple red dots and places of maximum resonance. Reznikoff argued that since prehistoric people visiting the caves would have done so in conditions of near-darkness, they would have made sounds as a kind of sonar, to determine whether there was space ahead and in which direction to move (Reznikoff 2006, 80). The coincidence of red dots and maximum resonance goes beyond what might be expected by chance alone, and indicates that those who visited and decorated these subterranean locations were aware of their special acoustic properties.

Recent research is adding a new dimension to the analysis of motifs and acoustics in Upper Palaeolithic caves, assessing the acoustics of the caves as a whole. Robust measuring methodologies followed by statistical processing are providing a greater level of reliability in interpretation, and introducing the all-important criterion of repeatability (Till 2014; Fazenda et al. 2017). Robust methodologies are being applied to the archaeoacoustics of decorated rock shelters in southern Spain, southern France, and the central Mediterranean (Díaz-Andreu & García Benito 2012; Díaz-Andreu *et al.* 2014; Díaz-Andreu & Mattioli 2016; Mattioli & Díaz-Andreu 2017; Mattioli *et al.* 2017). Soundscape and

archaeoacoustics approaches have also been applied to Temple Period Malta (Skeates 2017; Till 2017).

The superpositioning of motifs both in subterranean caves and in open air locations such as the Côa valley of northern Portugal (Blake & Cross 2015) suggest that it may have been production of the motifs as much as (or more than) their final appearance that was important. The act of carving of images on a rock face may have been intended to release powers or properties present in or beneath the surface, and the production of images will have been accompanied by the sound of the stone tools used to create them. The echoes from the pecking would have echoed around the valley. Ethnographer Åke Hultkrantz was told by the Wind River Shoshoni of the rock art they considered to be representations of the spirits. “According to my informants, the drawings have been steadily augmented in a mysterious way; one can hear the spirits chiselling their pictures if one comes near these places in the winter-time” (Hultkrantz 1986, 54).

Analysing spaces

For later periods of European prehistory, attention turns from caves and rock shelters to chambered tombs and standing stones. The scarcity of musical instruments from Neolithic contexts in western Europe (Wyatt 2009, 2010) contrasts markedly with the monumentality of the structures raised by early farming societies of the 5th to 3rd millennia BCE. These structures, sometimes megalithic in character, include well-known stone circles such as Stonehenge and Avebury, and closed burial chambers beneath cairns or mounds exemplified by Maeshowe on Orkney and Newgrange in Ireland.

The value of these studies is undeniable, and the potential for further work in this area is considerable. They suggest that the architecture of many Neolithic monuments allowed or encouraged the creation of sound effects using voice, hand-claps or simple percussion instruments (Watson & Keating 2000, 262).

Naturally enough, Stonehenge is among the prehistoric monuments that have attracted interest for their acoustical properties. There has long been debate on the nature of the rituals or ceremonies that were conducted at Stonehenge, especially in its latest phase (Stonehenge 3) when the construction of the lintelled circle and trilithons created a striking and impressive setting. Since 1723, when William Stukeley first remarked that the main axis was aligned on midsummer solstice sunrise, attention has focused on seasonal rituals, concerned perhaps with the waxing and waning of the year. More recently, it has been observed that a stronger argument can be made for a midwinter ritual, since the position of midwinter solstice sunset lies at the diametrically opposite horizon position on the same axis, and anyone approaching Stonehenge along its avenue (the paired banks and ditches leading up the site) would have been facing southwest rather than northeast (Chippindale 2004, 236-7). The central space at Stonehenge is very restricted, and would have allowed only a selected few to be directly present at whatever ceremonies were performed there.

Recent reinterpretation, in conjunction with new excavations at the neighbouring henge of Durrington Walls, opens the possibility that Stonehenge was not in fact intended for the living, but was a ceremonial structure associated with the dead and the ancestors (Parker Pearson & Ramilisonina 1998; Parker Pearson 2012). During the first few centuries of its existence it was a place of burial, with cremations inserted in the Aubrey Holes and the encircling ditch (Parker Pearson *et al.* 2009, Willis *et al.* 2016). Ceremonies for the living,

including midwinter feasts (for which there is evidence from pig remains: Parker Pearson *et al.* 2006, 234; Craig *et al.* 2015) were (it is argued) performed at Durrington Walls, a place of timber monumental structures. At Stonehenge, the sarsen structures linked to solar and lunar cycles symbolised permanence, eternity and perhaps eternal afterlife (Parker Pearson *et al.* 2006, 257, Parker Pearson 2012).

Watson and Keating led the way by undertaking a pioneering analysis that documented how sounds produced at the centre of the monument are affected by the arrangement of the stones (Watson 2006; Was & Watson 2017). Within the central area, the massive surrounding sarsens create enhanced sounds; while beyond the sarsen ring, higher frequencies are attenuated and only emerge through the gaps between the stones. The effects are heightened by the careful smoothing of the inner surfaces of the stones, as contrasted with their irregular outer faces. Yet, as Watson remarks, the existence of these effects does not in itself demonstrate that the monument was designed with acoustics specifically in mind (Watson 2006, 19).

One concern in such analyses is that Stonehenge today is visibly a degraded and ruinous monument. It has been suggested, indeed, that it was never completed (Ashbee 1998; Tilley *et al.* 2007), although gaps in the outer sarsen ring have left parchmarks, indicating that those sarsen unprights had once been in place (Banton *et al.* 2013). Missing elements may have been removed as building stone or as souvenirs or charms: as many as two-thirds of the original bluestones might have been destroyed in this way (Darvill & Wainwright 2009). At the same time, Stonehenge in its present form is a product of significant 20th century restoration. Of 36 sarsen unprights apparently *in situ*, 6 have been re-erected, 2 removed and replaced, and 15 straightened; while of the 19 bluestones standing today, 6

have been removed and replaced (Lawson in Cleal *et al.* 1995, 345-6).

Rupert Till endeavoured to overcome the limitations of the dilapidated condition of Stonehenge by analysing the acoustics of the concrete replica erected at Maryhill in Washington State (USA) in 1926 (Till 2009). The analysis assumed that Stonehenge was originally completed to a regular or uniform plan, and Till was again successful in demonstrating that the specific design of the monument generated significant acoustical effects. In particular, he noted that the outer sarsen circle created a sonic threshold; the acoustics seemed to focus on the central space bounded by the trilithons and the entrance. Sounds from the centre (including speech) were amplified, and it is easy to imagine how this may have enhanced performance within the monument in prehistory. Till sketches a hypothetical reconstruction of ceremonies involving rhythmic percussion within the circle, and the changing perception of these sounds as a celebrant or participant approached and then entered the circle.

These archaeoacoustical studies at Stonehenge reveal clear acoustical responses, but their relationship to prehistoric practices and activities is inevitably in some degree conjectural. Similar considerations apply in studying the acoustics of Neolithic chambered tombs (Watson & Keating 1999, 2000; Marshall 2016). Chambered tombs vary considerably in size, and the larger examples would lend themselves to practices impossible to perform in the smaller spaces typical of many chambered tombs. Furthermore, these may not have been empty spaces, but would have been littered with corpses or skeletal remains. The character of the burial deposits at many of these chambered tombs indicate that the associated practices involved repeated entry into the tomb, the insertion of new corpses, and (very often) the removal or rearrangement of earlier remains. A primary purpose of the

passage may indeed have been to allow the remains of the dead (in the form of isolated skeletal elements taken from decomposed bodies) to circulate among the living, forming a material and symbolic bond between those buried and those still alive. It is entirely plausible that in the course of these activities, individuals (or small groups where space allowed) entered the burial chamber in order to commune with the dead. Voices, flutes and drums or rattles may all have played a part in these rituals, and the acoustical properties will have enhanced any such performance, producing effects that were unexplained and perhaps considered mysterious or even other-worldly (Watson & Keating 1999). The evidence of excavated sites suggests, however, that people entering these spaces will often have had to pick their way among decaying corpses and defleshed skeletons, which (where present in sufficient quantities) may themselves have modified the acoustic response. The remains of the recently dead will certainly have had a powerful impact on the experience of any such musical performance. We should also recall, however, that the most striking aural feature of Neolithic chambered tombs is the exclusion of the ambient noise of the everyday world: the sound of silence itself marks them as special.

The response from many archaeologists to these and other archaeoacoustical studies has been cautious. It is easy to recognise the fundamental importance of sounds and performance to prehistoric societies, but less easy to develop a robust methodology for their investigation. Measuring the acoustical properties of prehistoric structures does not in itself resolve the uncertainty as to whether those properties were intended or whether even they were recognised and exploited (Scarre 2006). As Richard Bradley has observed, the particular acoustic effects at certain passage graves are unlikely to have been part of the design, since that would require a knowledge of theoretical physics (Bradley 2009, 70). The argument that intentionality is a modern Western concept – that seeking to know

whether these effects were intended is an anachronistic endeavour – does not in itself resolve the challenge of determining an acceptable methodology that will be found persuasive by the greater part of the archaeological community.

Where open-air sites are concerned, the issue of environmental noise is also to be considered. The acoustic interference of a circle of modest-sized stones some 30m or 50m in diameter is inevitably relatively small and is easily masked by wind or rain. Stonehenge is an exception in this regard, the size and tight spacing of the large sarsens producing a truly enclosed effect. As Rupert Till has observed, Thomas Hardy wrote in *Tess of the D'Urbervilles* of the wind at Stonehenge producing “a booming tune, like the note of some gigantic one-stringed harp” (Till 2009). The smaller and more dispersed stones of Castlerigg or Callanish in themselves can make only a modest contribution to wind noise, but their exposed locations ensure that wind (and rain) will frequently generate sounds at levels sufficient to mask human voices at any distance (Fig. 1). The alternative, that they were built as mute stone monuments, beyond the realm of the living, remains a distinct possibility.



Figure 1: Castlerigg stone circle (Cumbria), illustrating the relatively exposed upland location and the widely spaced stones. Image: Chris Scarre

These observations remind us of the importance of archaeological context in applying archaeoacoustical analysis to prehistoric monuments. Beyond Europe, archaeoacoustical research has sometimes had the advantage of other lines of evidence that support the importance of sound and performance within the monumental setting. Chavín de Huántar in Peru, where acoustic effects from subterranean passages built into the structure were first noted in the 1970s (Burger 1992), continues to provide an excellent illustration. The discovery of *Strombus* shell trumpets, showing signs of wear, in one of these galleries, strengthens the case that musical or acoustic effects were an important part of ceremonies conducted here, and that the architecture was designed to enhance them (Rick 2005; Kolar 2017). Elaborate carvings and psychoactive drugs also played a part in the ritual practices at Chavín, acting along with the modified landscape and the highly planned ritual context

as part of a “finely tuned manipulation on the part of the site’s planners, executors, and orchestrators . . . to promote a vision of the world at variance with prior experience, a world of differentiated humans of intrinsically different qualities, among them authority” (Rick 2005, 86-87). The Tello obelisk that was situated at the heart of Chavín, carved perhaps to represent the Giant Cayman of the Amazon, may connect to the roaring sound produced by pouring water down the central subterranean canal, “a sonic interface for a roaring cayman who inhabits the building, its underground spaces, or another unseen dimension of Chavín’s ritualscape” (Kolar 2017, 54). It is tempting to associate the megalithic monuments of western Europe with similar ritual performance. What we need first, however, is to focus our attention on the ceremonial practices and their remains, not just the architectural forms and their inherent acoustic.

Conclusion

The ubiquity of human musical behaviour makes such behaviour an essential concern in any attempt to understand the nature of lived experience in prehistoric societies, as in those of more recent periods. Yet the recoverability of that musical behaviour, in the absence of written records, inevitably poses a challenge. As we have seen, indications are available in the form of surviving musical instruments and in ethnographic testimony that alerts us to the kinds of musical behaviour that may be at issue. The key messages from ethnography are the primary role of the human voice and body in most societies, and the kinds of other sound producers (‘instruments’) that have been used. Many of these will have been of organic materials that are unlikely to survive in archaeological contexts. Drums are a prominent feature of Siberian shamanistic practices, but will have left little direct trace in the archaeological record. Ceramic drums, on the other hand, or animal bones strung as

rattles, may have been more common than is currently apparent (Aiano 2006).

The area of research that has seen most activity in recent years is without doubt the investigation of the acoustics of enclosed spaces, be they natural caves and rock shelters, or built structures. The potential of a multi-sensory approach to the past is beyond question, and consideration of non-material aspects such as taste, smell and sound should be the essential complement to all studies of material remains. We must avoid the temptation, however, of regarding prehistoric structures as we might Classical Greek theatres. All enclosed structures will present associated acoustic properties, but independent lines of evidence or argument are required if we are to determine how those properties were used. . Excavation of individual sites may sometimes encourage reappraisal of scenarios that have been proposed, but also reveals evidence of specific activities and ritual practices that can inform archaeoacoustical interpretations. Archaeology already has its rock art; the study of archaeoacoustics may yet be able to reveal the character, if not the notes, of its rock music.

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